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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/598,316

06/23/2008

James E. Usowicz

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Waters Technologies Corporation  
34 MAPLE STREET - LG  
MILFORD, MA 01757

EXAMINER

JELLETT, MATTHEW WILLIAM

ART UNIT

PAPER NUMBER

3753

MAIL DATE

DELIVERY MODE

01/25/2012

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/598,316	USOWICZ ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	MATTHEW W. JELLETT	3753	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 07 November 2011.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 5) ☒ Claim(s) 1-23 is/are pending in the application.
- 5a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 6) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 7) ☒ Claim(s) 1-23 is/are rejected.
- 8) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 9) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☒ The drawing(s) filed on 04 June 2008 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 12) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____.                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date ____.  | 6) <input type="checkbox"/> Other: ____.                          |

**DETAILED ACTION**

**Second Non-Final**

***Response to Amendment***

1. Claims 1-23 remain pending in the application. Claims 1-3, 6, 11-14, 17, 22 and 23 are amended. Applicant has amended claims 1, 3, 12 and 14 to overcome the drawing objections, and accordingly the objection to the drawings and the corresponding claim objections are hereby withdrawn. Applicant has amended claims 1, 2, 11, 12, 13, 22, and 23 to overcome the 35 USC 112 second paragraph indefinite rejections and accordingly the 112 rejection to those claims are hereby withdrawn.

***Response to Arguments***

2. Applicant's arguments, see Applicants response to the First Office Action on the Merits, filed 11/07/2011, with respect to the rejection(s) of claim(s) 1-23 under 35 USC 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made under 35 USC 103(a) as the claims seen below being unpatentable over *Nichols* in view of *Uesugi et al.* (US 2003/0147302).

***Claim Rejections - 35 USC § 112***

**The following is a quotation of the second paragraph of 35 U.S.C. 112:**

**The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.**

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**3. Claims 8-11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.**

**Regarding** claim 8, the phrase "selected from" renders the claim indefinite because it is unclear whether the limitation(s) following the phrase are claimed in the alternative or part of a group as a whole with the grouping open ended. See MPEP § 2173.05(h). The phrase will be interpreted as "selected from a group consisting of" in furtherance of compact prosecution.

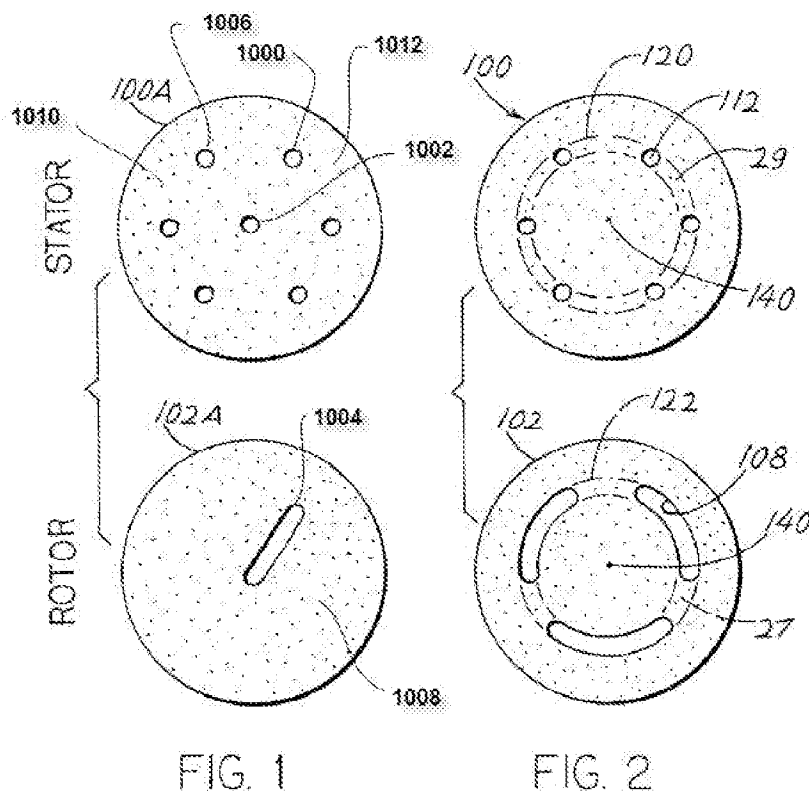
### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**4. Claims 1, 2, 3, 4, 5, 8, 12, 13, 14, 15, 16, 19, and 23, as far as they are definite, are rejected under 35 U.S.C. 103(a) as being unpatentable over *Nichols* (US 6453946) in view of *Uesugi et al.* (US 2003/0147302).**

**In Claims 1 and 12 *Nichols* discloses** the device and in the alternative provides a device capable of performing the method steps of controlling flow of fluid, as can be seen in Figs. 1 and 2 below:



A device for controlling the flow of fluid comprising (Fig. 1): a rotor (102A) having a rotor fluid communication means (1004 Fig. 1) and at least one rotor load bearing surface (1008) which rotor load bearing surface sealably engages a stationary load bearing surface (Col 5 lines 45 – 50), said rotor capable of assuming a first position and a second position by rotation (Col 1 lines 16 – 25 where the rotor rotates to select the passages on the stator); at least one stator (100A Fig. 1) having said stationary load bearing surface (1010 Fig. 1) having stator fluid communication means (passages located on the stator Fig. 1), said stationary load bearing surface sealably engaging said rotor load bearing surface and permitting rotation of said rotor with respect to said stator (Col 5 lines 45 – 50), at least one of said rotor bearing surface and said stator load bearing

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surface having a diamond like carbon coating (162 Fig. 7, tungsten carbide/carbon is a form of diamond like carbon); compression means for holding said at least one stator and rotor with said rotor load bearing surface and stationary load bearing surface sealably engaged (the device requires a clamping means to exceed the high pressure, for example 5000 psi (see Col 1 lines 65-67, Col 2 lines 23 – 35), it is well known in the art to use a housing or other clamping means to hold the rotor and stator together under high levels of pressure. The express, implicit, and inherent disclosures of a prior art reference may be relied upon in the rejection of claims under 35 U.S.C. 102 or 103. “The inherent teaching of a prior art reference, a question of fact, arises both in the context of anticipation and obviousness.” In re Napier, 55 F.3d 610, 613, 34 USPQ2d 1782, 1784 (Fed. Cir. 1995) (affirmed a 35 U.S.C. 103 rejection based in part on inherent disclosure in one of the references). See also In re Grasselli, 713 F.2d 731, 739, 218 USPQ 769, 775 (Fed. Cir. 1983). *Nichols* clearly discloses the clamping means because *Nichols* must have a means such as a housing to hold the rotor and stator together under high levels of compressive forces (i.e. 5000 psi or greater)), and said diamond carbon coating providing a low friction and increased hardness allowing repeated movement between said first and second positions (Col 1 lines 45-50). *Nichols* **does not disclose** or teach a diamond-like carbon-silica coating (silicon carbide). *Uesugi* **does teach** the use of a diamond-like carbon-silica coating (silicon carbide, paragraph 0023), where the use of a ceramic such as silicon carbide is used as the surface on the stator, and it should be noted that silicon carbide is a compound of silicon and carbon where the material is used for ceramics and has a very high hardness, high resistance to wear, high corrosion resistance, and high strength (all characteristics which are diamond-like). It would have been obvious to one of ordinary skill at the time of the invention to modify the device of

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*Nichols* to utilize in lieu of the diamond-like carbon cover of *Nichols* on either the stator or rotor surfaces, the silicon carbide surface of *Uesugi* so that the surface of either the stator or rotor of *Nichols* may be able to withstand a higher level of wear or a higher level of sealing pressure, or resistance to high levels of temperature caused by frictional resistance during operation of the valve.

**In regards to Claims 2 and 13** *Nichols* discloses: a housing for the reasons as discussed above regarding the clamping means, because *Nichols* must have a means for securing well known in the art such as a clamp, screw or bolt to hold the rotor and stator together under high levels of compressive forces (i.e. 5000 psi or greater).

**In regards to Claims 3 and 14** *Nichols* discloses: The device of claim 1 wherein said stator fluid communication means is at least one stator opening (1000 Fig. 1) in said stator (1012).

**In regards to Claims 4 and 15** *Nichols* discloses: The device of claim 1 wherein said rotor fluid communication means comprises at least one opening (1004 acts as an opening to channel fluid from 1002 to for example 1006 or vice versa).

**In regards to Claims 5 and 16** *Nichols* discloses: The device of claim 3 wherein said rotor fluid communication means comprises a channel for placing two or more stator openings in fluid communication (1004 Fig. 1).

**In regards to Claims 8 and 19** *Nichols* discloses: The device of claim 1 wherein at least one of said rotor and stator is comprised of a material selected from polyetheretherketone, tetrafluoroethelene, combinations of polyetheretherketone and tetrafluoroethelene, stainless steel, titanium and aluminum (Col 5 lines 1 - 5).

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**In regards to Claim 23**, as far as it is definite, *Nichols* further discloses: [the device] wherein said rotor is capable of assuming more than two positions by rotation (See Fig 1 where 1004 can be rotated to meet additional openings on the stator which provides for more than two rotational positions of the rotor).

**5. Claims 6, 7, 17, and 18 are rejected as far as they are definite under 35**

**U.S.C. 103(a) as being unpatentable over *Nichols* in view of *Uesugi*, as applied to claims above, and further in view of *Doll* (US 2006/0257663).**

*Nichols modified above* does not disclose the diamond like carbon – silica coating with the proportions that fall within the range as seen in Claim 6. But, *Doll* does teach an embodiment that falls within the ranges of the diamond-like carbon-silica coating being 40-90% carbon, 20-40% hydrogen and 0.0 to 5% silica carbon (See abstract). It would have been obvious to one of ordinary skill at the time of the invention to further modify the device by utilizing the rotor and stator as provided in *Nichols* to include proportions of carbon, hydrogen, and silicon as seen in *Doll* as a matter of engineering expedient to provide the hard / wear resistant diamond like carbon / glass and amorphous coating so as to reduce adhesion between the surfaces of the rotor and the stator.

**In regards to Claims 7 and 18** *Nichols* further discloses: the diamond like carbon-silica coating is a DLC coating (Col 4 lines 42 - 45, it is commonly know in the art that Tungsten Carbide/Carbon (WC/C) composition is a diamond like carbon material.)



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**6. Claims 9-11 and 20-22 are rejected as far as they are definite under 35 U.S.C. 103(a) as being unpatentable over *Nichols* in view of *Uesugi*, as applied to claims above, and further in view of *Ahlgren* (US 6719001).**

*Nichols* modified above, further discloses the use of stainless steel (Col 2 lines 20-25) and titanium (Col 5 lines 30 - 35) as materials for the rotor or stator, but does not disclose the use of polyetheretherketone or aluminum for the rotor and/or stator. But *Ahlgren* does teach the use of polyetheretherketone and/or aluminum as one of the materials for construction of a rotary valve (Col 6 lines 25-60). *Ahlgren* also teaches the use of stainless steel, titanium, and tetrafluoroethylene as materials for construction of a rotary valve (Col 6 lines 25-60).

Accordingly, it would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the combination the materials of stainless steel and titanium, as provided in *Nichols* for the construction of the rotor or stator, in combination with the material of aluminum as seen in *Ahlgren* . Furthermore, it would have been obvious at the time of the invention for one of ordinary skill in the art to further modify utilizing the material of tetrafluoroethelene as provided in *Nichols* to combine it with the material of polyetheretherketone as utilized in *Ahlgren* to construct the stator or rotor portions of the rotary valve, as also shown in *Ahlgren* . Accordingly, either one or both the rotor or the stator could be constructed of polyetheretherketone and tetrafluoroethelene and/or combinations thereof, and either one or both the rotor or stator could be constructed of stainless steel, titanium and aluminum. In doing so, the stator or rotor would as mentioned in *Ahlgren* (Col 6 lines 25-60) be strongly resistant to abrasion and chemically compatible with components of the fluid itself.

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**Furthermore, with reference specifically to Claims 9, 10, 20, and 21** it would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the device of *Nichols* by utilizing a combination of polyetheretherketone and tetrafluoroethelene as taught by *Ahlgren*, where it would have been a matter of engineering expedient to utilize a percentage of 50 to 90 percent polyetheretherketone and a percentage of 10 to 50 percent tetrafluoroethelene or utilize a percentage of 60 to 80 percent polyetheretherketone and a percentage of 20 to 40 percent tetrafluoroethelene, so as to attenuate the levels of hardness and roughly match the corresponding desired fluid pressure range for the particular system.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Nagaoka (US 2003/0230649) discloses an electromagnetic fuel injection valve that utilizes a high hardness coating of diamond like carbon including silicon that is formed on the outer surface of the assembly in contact with the guide portion; Mastro (US 6508416) discloses a coated fuel injector valve that utilizes a diamond like carbon stabilized by silicon, titanium and tungsten.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MATTHEW W. JELLETT whose telephone number is (571)270-7497. The examiner can normally be reached on Monday - Friday 7:30 am - 4:30 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Hepperle can be reached on (571) 272-4913. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/MATTHEW W JELLETT/  
Examiner, Art Unit 3753

/John K. Fristoe Jr./  
Primary Examiner, Art Unit 3753